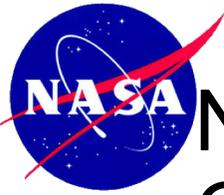




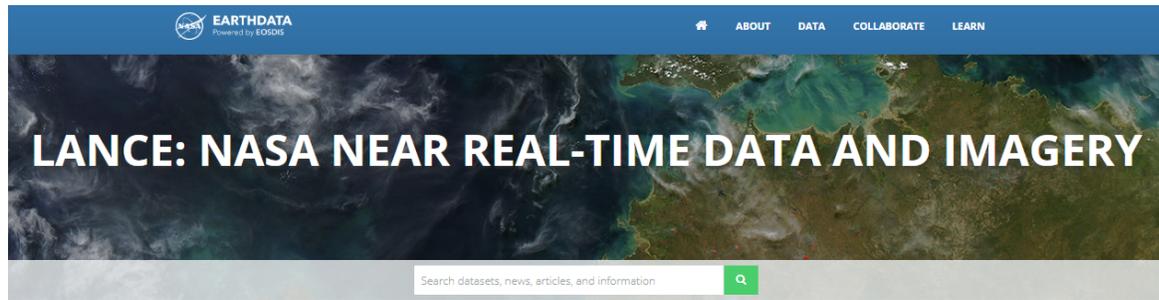
# NASA's Land, Atmosphere Near real-time Capability for EOS (LANCER) Supports Users in SBG Application Areas.

Diane Davies (NASA GSFC/SSAI, LANCE Operations manager)

Tian Yao (NASA GSFC/SSAI, Disasters-LANCE coordinator)



# NASA's Land, Atmosphere Near real-time Capability for EOS (LANCE)



Earth Observation Data • LANCE: NASA Near Real-Time Data and Imagery

Land, Atmosphere Near real-time Capability for EOS (LANCE)



NASA's Land, Atmosphere Near real-time Capability for EOS (LANCE) supports users interested in monitoring a wide variety of natural and man-made phenomena.

Near real-time (NRT) data and imagery from the following instruments are available much quicker than routine processing allows:

Atmospheric Infrared Sounder (AIRS)
Advanced Microwave Scanning Radiometer 2 (AMSR2)
Lightning Imaging Sensor (LIS) on the International Space Station (LIS ISS)
Multi-angle Imaging SpectroRadiometer (MISR)
Microwave Limb Sounder (MLS)
Moderate Resolution Imaging Spectroradiometer (MODIS)
Measurement of Pollution in the Troposphere (MOPITT)
Ozone Monitoring Instrument (OMI)
Ozone Mapping Profiler Suite (OMPS)
Visible Infrared Imaging Radiometer Suite (VIIRS)

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**Data**

[Download Near Real-Time Data](#)  
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[External Near Real-Time Data](#)  
[FIRMS:Fire/Hotspot data](#) | [Email Alerts](#)

**Imagery**

[Overview of Near Real-Time Imagery](#)  
[Worldview](#)  
[Worldview Snapshots](#)  
[Global Imagery Browse Services \(GIBS\)](#)  
[Rapid Response](#)

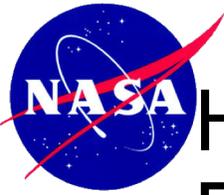
- Most **LANCE near real-time (NRT)** data products are available within **3 hours** from satellite observation.
- LANCE NRT imagery is generally available within **3-5 hours** after observation from **GIBS and Worldview**.
- LANCE provides NRT data and imagery from **10 instruments** much quicker than routine processing allows: AIRS, AMSR2, LIS, MISR, MLS, MODIS, MOPITT, OMI, OMPS, and VIIRS.
- LANCE Provides access to **87 products**.
- Karen Michael is LANCE manager. Diane Davies is LANCE operations manager.



# LANCE User Working Group (UWG)



- LANCE is managed by ESDIS but steered by a User Working Group (UWG) responsible for providing guidance and recommendations concerning a broad range of topics related to the LANCE system, capabilities, and services. The UWG represents the broad needs of the LANCE applications user communities, while maintaining close ties with the various Science Teams for the instruments included in LANCE. The UWG meets twice a year to ensure that LANCE capabilities are aligned with the NRT community needs.
- UWG recommendations are made to ESDIS, which in turn engages NASA Headquarters concerning the feasibility and cost of implementation.
- The UWG is chaired by Professor Chris Justice (University of Maryland). Dr. Miguel Roman (Universities Space Research Association) will be the new UWG chair this fall.



# How to Browse and Download LANCE NRT Data Products and Imagery



- Visualize LANCE NRT data via Worldview/GIBS/FIRMS:



<https://earthdata.nasa.gov/earth-observation-data/visualize-data>

- Register with Earthdata Login to start downloading LANCE NRT data:



<https://earthdata.nasa.gov/earth-observation-data/near-real-time/download-nrt-data>

- Some LANCE NRT data products have been linked to enhance Disasters Mapping Portal (e.g. NASA GSFC NRT MODIS Global Flood Mapping products):

<https://maps.disasters.nasa.gov/>





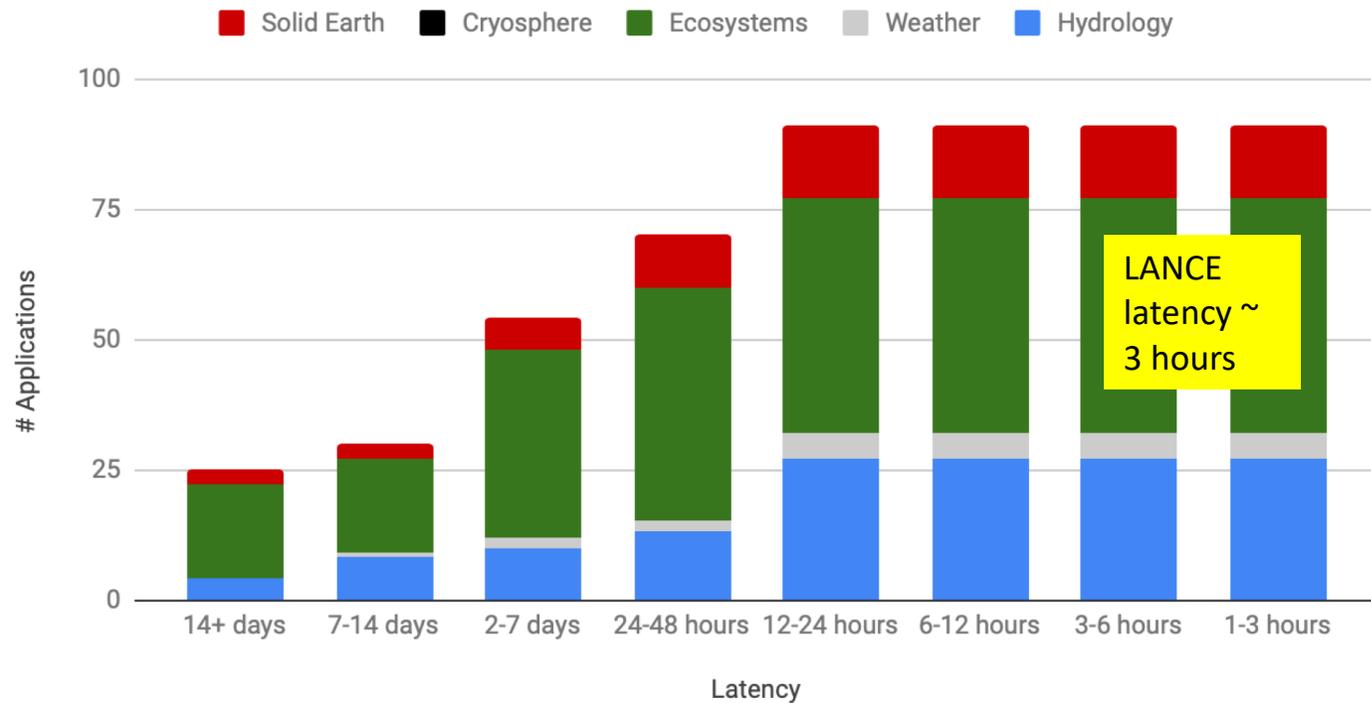
# LANCE Users

LANCE products are routinely used by **direct users**, who access data for their own purposes, and by **brokers** who add value to the data by combining it with other specialist knowledge and serve it to targeted end users.





# LANCE meets the latency requirement for SBG applications



Information from SBG Science and Applications Traceability Matrices (SATM) show that the latency of LANCE Near Real-time products 100% meet the requirement of currently identified SBG applications.

(This figure is adapted from Dr. Jeffrey Luvall's slides)



# LANCE supports users in SBG application areas

## SBG application focus areas:

- ecological forecasting,
- water resources,
- health and air quality,
- disasters,
- capacity building.

## SBG additional areas:

- food security and agriculture,
- international collaborations,
- new mission.



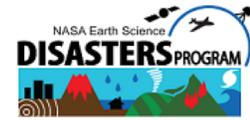
# LANCE supports users in SBG application areas

## Sample products in Ecological Forecasting: Forest Management

- Forest management: MODIS/VIIRS Fire and Thermal Anomalies product; MODIS/VIIRS Surface Reflectance product; MODIS/VIIRS Land Surface Temperature product

### Examples of End Users

Organization	Products	Purpose
WRI Global Forest Watch	MODIS/VIIRS Fire products	Monitor forests, early detection of illegal clearing or logging, improved governance and accountability.
Conservation International	MODIS/VIIRS Fire products	Improve land use management. Enhance enforcement activities. Support carbon monitoring



# LANCER supports users in SBG application areas

## Sample products in Water Resources:

- Snow and ice monitoring: MODIS/VIIRS snow cover product; AMSR2 snow product; MODIS/VIIRS albedo product; MODIS/VIIRS land surface temperature product;
- Climate and hydrologic modeling: SMAP soil moisture product (TBD).

## Examples of End Users

Organization	Products	Purpose
Naval Research Laboratory	AMSR2 surface precipitation, wind speed over ocean and cloud liquid water over ocean	For meteorological applications including tracking hurricanes and tropical storms
National Weather Service(NWS) Aviation Weather Service, NWS Ocean Prediction Center, NOAA National Hurricane Center, NWS Pacific Region	Lightning Imaging Sensor (LIS) on the international Space Station	Improved short-term weather forecasting.



# LANCE supports users in SBG application areas

## Potentially useful products for Air Quality:

- Air Quality: OMI/OMPS Aerosol Index product; MODIS Aerosol Optical Depth products; AIRS/MLS/MOPITT Carbon Monoxide products; AIRS Dust Score product; MLS Nitric acid product; MLS Nitrous oxide product; MLS/OMPS Ozone product; AIRS/MLS/OMI/OMPS Sulfur Dioxide product; MODIS Cloud product.

## Examples of End Users

Organization	Products	Purpose
EPA AirNow-Tech Navigator	MODIS/VIIRS Corrected reflectance imagery and Aerosol Optical Depth	Monitoring air quality. Satellite data are used to fill the data gaps in air quality information
UMBC Smog Blog	MODIS/VIIRS Corrected reflectance imagery and Aerosol Optical Depth	Provide information to the public on air quality. Satellite data are useful for identifying long distance sources (e.g. dust, smoke).



# LANCE supports users in SBG application areas



## Sample products in Disasters:

- **Landslides:** SMAP soil moisture product (TBD); MODIS/VIIRS/MISR Surface Reflectance product
- **Volcano Eruption:** MODIS MODVOLC Volcano product; MODIS/VIIRS Fire and Thermal Anomalies product; OMI/OMPS Aerosol Index product; MODIS Aerosol Optical Depth products; AIRS/MLS/MOPITT Carbon Monoxide products; AIRS/MLS/OMI/OMPS Sulfur Dioxide product; MODIS Cloud product; MODIS/VIIRS/MISR Surface Reflectance product

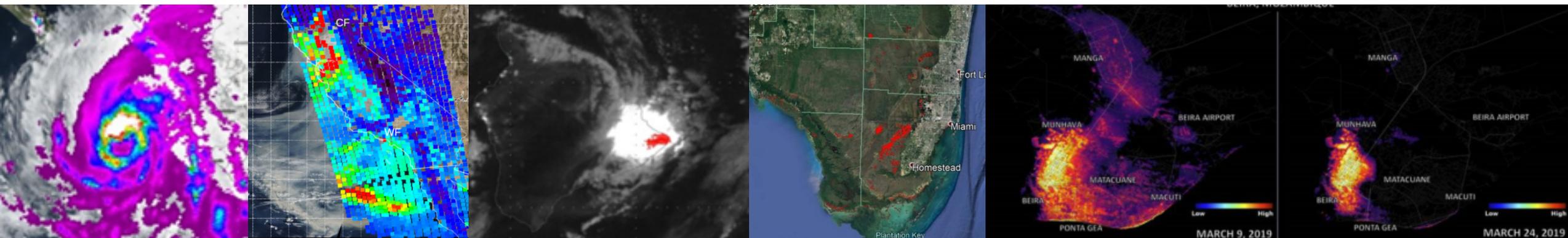
## Examples of End Users

Organization	Products	Purpose
ESA's Support for Aviation Control Service	AIRS OMI/OMPS Sulfur Dioxide	To support aviation control and avoidance of volcanic ash
Alaska Volcanic Ash Advisory Service	OMI/OMPS SO <sub>2</sub>	To keep aviators informed of volcanic hazards by monitoring Volcanic Ash plumes within their assigned airspace



# LANCE supports users in Disasters

LANCE provides near real-time products supports disaster risk reduction activities before, during and after a disaster including volcano eruptions, landslides, wildfire, flood, hurricane, earthquake and etc..



**AMSR2 Surface Precipitation Rates product**

**MOPITT CO product**

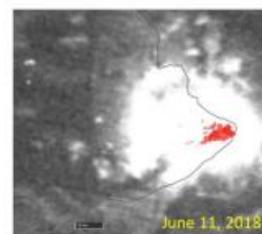
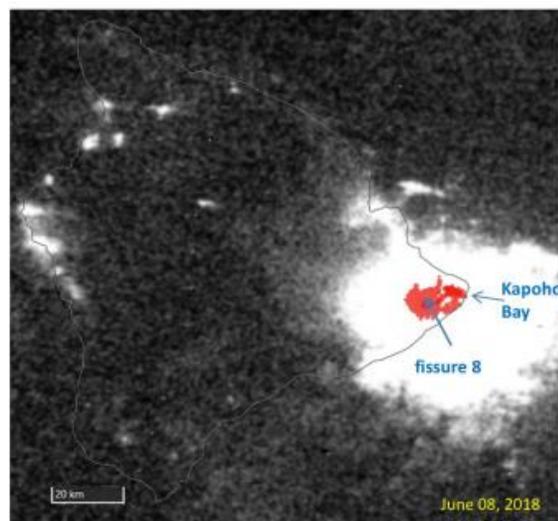
**VIIRS Fire product**

**MODIS NRT Flood Mapping product**

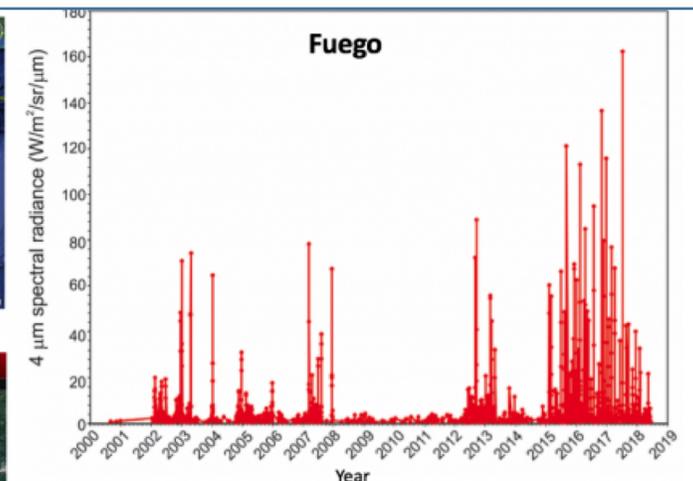
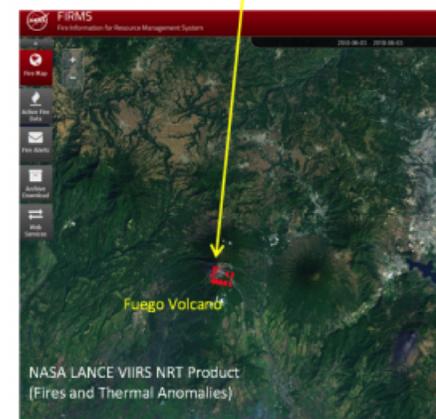
**NASA's Black Marble Nighttime Light product**

# LANCE supports users in Disasters

## Sample products in Disasters for Volcano Eruptions:



The satellite images show that in Hawaii's Big Island, lava flows are located by LANCE VIIRS Fires NRT product, with the base map of VIIRS nighttime imagery in June, 2018.



The figure shows a plot of total emitted radiance (at 4 microns) from Fuego volcano observed by MODIS MODVOLC Volcano product from 2000 to present.



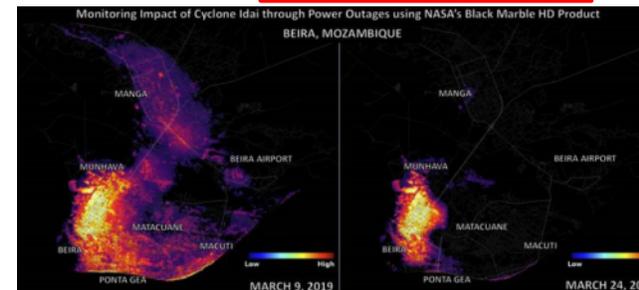
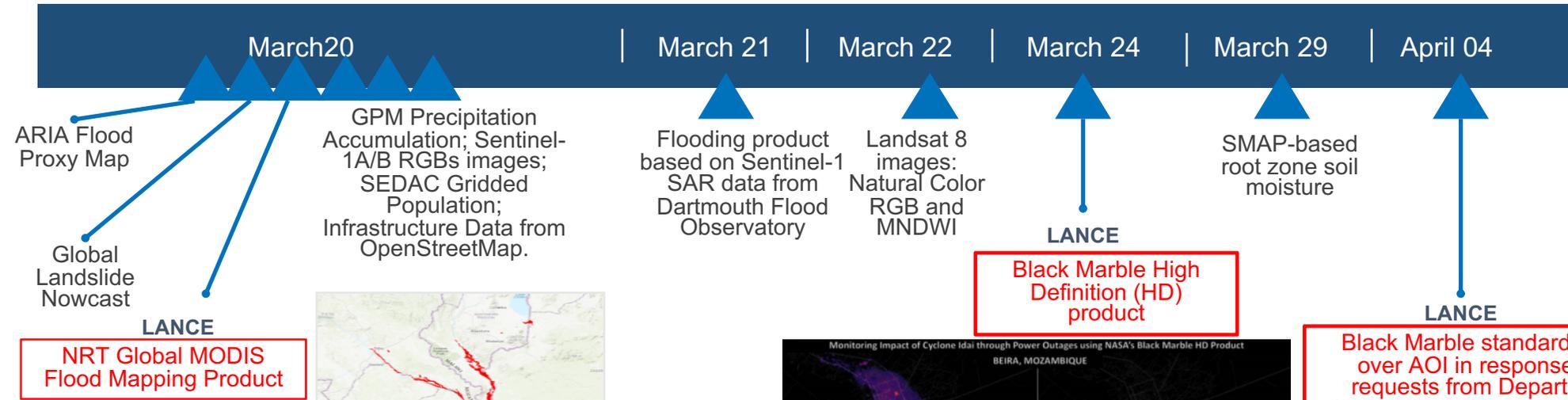
# LANCE supports users in Disasters



"I've heard from our field teams that the maps that we are making with NASA data are also being used **by the Mozambique government for initial assessments and decision-making**, so that's great news. The data you're providing is very useful for us as we work with partners to respond to the flooding." **Lauren Bateman, IFRC**

"In terms of any direct asks we have relating to data needs for our current production on Tropical Cyclone Idai, there is one item of interest that stands out.  
1. **Black Marble Power Outages** – We see this is available for the city of Beira. Is it possible to get this on the scale of the entire province of Sofala in Mozambique? Access to electric is key for proper hygiene, especially this long after the onset of the disaster and, combined with flood extent and displacement, can be really helpful in showing the scale of potential Cholera/disease outbreaks."  
**Ryan Latgis, Humanitarian Information Unit, U.S. Department of State**

## 2019



NASA Response and Engagement Timeline for Tropical Cyclone Idai (March-April 2019)



# LANCE supports users in SBG application areas

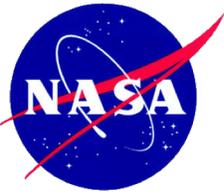


## Sample products in Food Security and Agriculture :

- Agricultural monitoring: MODIS surface reflectance product; MODIS vegetation index products; MODIS/VIIRS Land Surface Temperature product;

## Examples of End Users

Organization	Products	Purpose
Famine Early Warning Systems Network (FEWSNET) USGS / USAID	MODIS surface reflectance (SR) for vegetation indices and MODIS land surface temperature for evapotranspiration models	Crop condition monitoring for early warning and analysis on acute food insecurity.
GeoGLAM Crop Monitor	MODIS 8-day rolling vegetation indices (NDVI and EVI) and 8-day rolling MODIS surface reflectance	Crop monitoring to enhance crop production projections

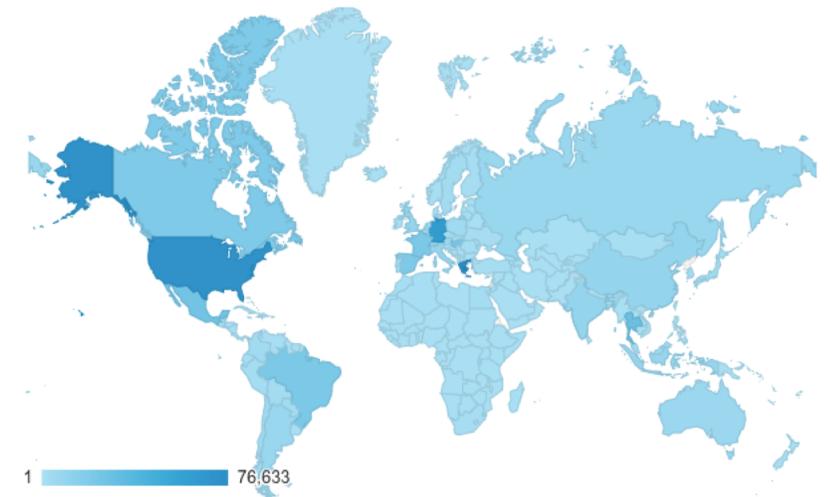


# LANCE – Where are we now?

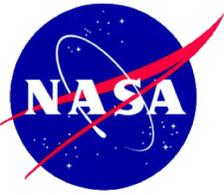
- This year marks the 10<sup>th</sup> Anniversary of LANCE
- Well established and increasing user base
- There is a lack of new NASA missions with NRT requirements

The LANCE UWG is considering whether it should consider partnerships or leverage data from other missions (e.g. GOES-R, Sentinel SAR – is there a demand for NRT products?)

NRT considerations need to be incorporated during Pre-Phase A of new mission requirements. Adding a NRT capability is an engineering problem and asking for a low latency capability after the mission has been designed is often prohibitively costly.



Locations of LANCE Users  
1 Jan – 16 October 2019

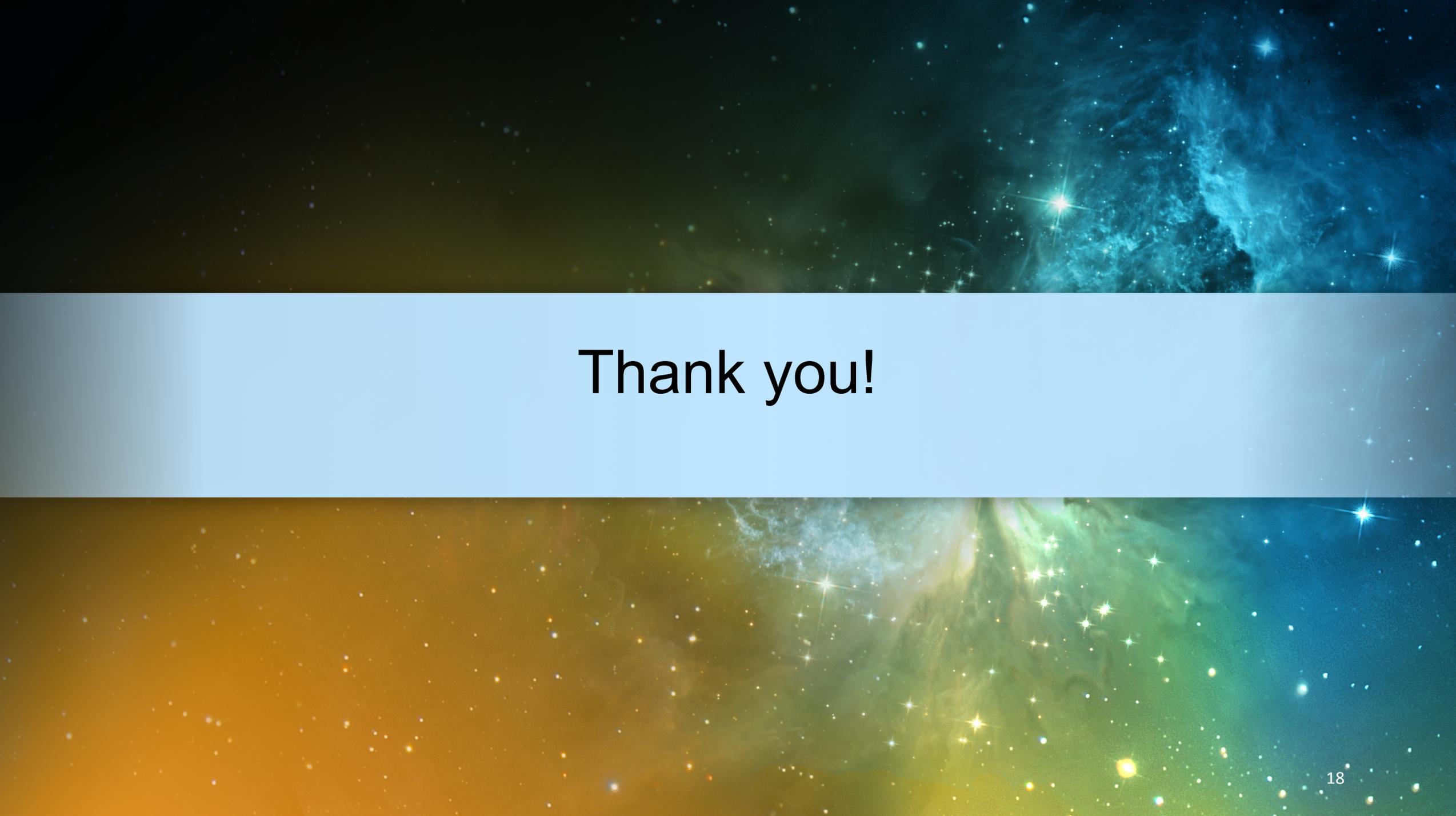


# LANCE – Where are we now?



## Sample products in New Missions (TBD):

- The NASA ISRO Synthetic Aperture Radar (**NISAR**) mission is scheduled for launch in 2021, which has potential NRT applications.
- NISAR: Soil moisture product; RTC product; Displacement Maps; Damage assessment maps; Flood extent maps.

The background of the slide is a composite of two cosmic images. The top half features a dark blue and black space filled with numerous small stars and a prominent, bright blue nebula on the right side. The bottom half features a warm orange and yellow space with many stars and a greenish-yellow nebula on the right side. A light blue horizontal band runs across the middle of the slide, containing the text "Thank you!".

Thank you!



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